DEPARTMENT OF

CHEMISTRY

CHEM UG Courses

UG Courses offered in Summer Term 2021-2022 but the courses outlines are not time-specific

Course Code	Course Title
CHEM 1020	General Chemistry 1B
CHEM 3020	Chemistry in the Mass Media
CHEM 3610B	Chemistry Internship
CHEM 4680	Undergraduate Research
CHEM 4691	Capstone Research I

The Hong Kong University of Science and Technology
Department of Chemistry

CHEM 1020 – General Chemistry IB (3-credits) **Summer 2021 -2022**

Instructors: Prof. Emily Ming Wai Tsang (chetsang@ust.hk)

Course Description:
This course targets at students who have acquired more advanced knowledge in fundamental Chemistry in high school. Key topics include atomic structure and periodicity, bonding theories, chemical energy, and properties of gases, liquids and solids. Other topics such as chemical kinetics, chemical equilibrium and organic molecules will be briefly reviewed.

Pre-requsites: *Level 3 or above in HKDSE 1x Chemistry*

Exclusions: *CHEM 1010*

Lecture: Mon, Wed & Fri, 14:00 – 17:20

Venue: Rm 2405, Lift 17-18

Instructor Office Hours: By email appointment

Textbook: *Chemistry: An Atoms First Approach*, 3rd Asian Ed. S.S. Zumdahl; S. A. Zumdahl; D. DeCoste © Cengage Learning. ISBN: 9789814896993

Course Content/Topics:

- ☐ Chapter Review: Measurement and Calculations in Chemistry
- ☐ Chapter 1: Chemical Foundations
- ☐ Chapter 2: Atomic Structure and Periodicity
- ☐ Chapter 3: Bonding - General Concepts
- ☐ Chapter 4: Molecular Structure and Orbitals
- ☐ Chapter 5: Stoichiometry
- ☐ Chapter 6: Types of Chemical Reactions and Solution Stoichiometry
- ☐ Chapter 7: Chemical Energy
- ☐ Chapter 8: Gases

Intended Learning Outcomes:
Upon successful completion of this course, students are expected to be able to:

1. Describe and apply fundamental principles and terminologies of chemistry.
2. Develop a microscopic view of the world in terms of atoms and molecules and their change
3. Describe and apply concepts of mass conservation and energy conversation in chemical changes.

4. Describe the atoms and ions in terms of atomic structure, atomic orbitals, electron configuration, and periodicity of chemical properties
5. Describe molecules in terms of bonding theory, energy, molecular geometry and interactions.
6. Describe a chemical reaction from an equilibrium, thermodynamic and kinetics point of views.
7. Describe the physical states of matters: gases, liquids and solids.
8. Recognize and appreciate the impact of chemistry to our society.

Course Grading Scheme

Midterm Exam	50 %
Final Exam	50 %

香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Course Outline

CHEM 3020 Chemistry in the mass media

Summer Semester 2022

1. Course details

Course Instructor:	Prof. Jason K. K. CHAN Assistant Professor of Science Education, Department of Chemistry
Email:	kkjchan@ust.hk
Credits:	3 credits
Class time:	Mon, Wed, Fri 2:00 – 5:20 PM 20 June – 15 July
Class venue:	CYT-UG002 or Rm 5506 (Lift 25/26) (see schedule)

2. Course arrangements

There are three components in this course:

A. **Seminar classes**

These lectures are interactive seminars: students may need to complete some pre-class reading and be engaged in small group discussions, polls, critique and reflection tasks during the lectures.

The lecture topics are focused on different aspects of the scientific method, applied to chemistry-related issues in society or daily life.

B. Case study project

Each student will choose a topic from the public media/social media/commercial advertisement/product labelling and study the scientific claims. They will carry out two aspects of directed research:

Literature research

They will research the primary literature to assess the current scientific findings related to their case study topic. Based on these literature results, they will evaluate the accuracy and validity of the scientific claims.

Experimental research

Each student will also design suitable laboratory experiments, interviews or surveys to test out some aspects of the scientific claims or public perception to the scientific claims. Basic laboratory support will be provided for the groups to carry out some analytical experiments or outsourced to external accredited testing laboratories. Although there will be limitation on the amount of experimental

work that can be completed within the course duration, the process of designing suitable experiments, obtaining evidence and evaluating data will be a valuable learning experience.

The students will meet with the instructors for consultations frequently throughout the course.

C. Communication of results

Student groups will produce science communication for both professional and laymen audience to present their case study findings.

Scientific report for professional audience

Each student will write up a case study report (2000 – 5000 words) to communicate their findings to a professional audience in the usual format of research reports, containing proper citations, experimental section and any supporting information.

Science communication for laymen audience

Each group will also design an article for effective laymen communication, which may take the form of a video clip, newspaper/magazine article, social media article or poster. He/she may use more than one form of communication and each student is free to decide on the most suitable approach.

Avoiding specific references to products, companies or brands, we will seek opportunities and channels to publish their science communication to reach the public audience in the local community and evaluate their effectiveness.

Experts in the science communication field will be invited to provide assessment and comments to the students.

3. Course weighting and grading

A. Course participation 20 %
(Lectures and project work)

B. Scientific report for professional audience* 40 %

**includes instructor's assessment (20 %) and assessment by two other HKUST academic staff (20 %)*

C. Science communication for laymen audience* 40 %

**includes peer-evaluation (10 %) and instructor's assessment (10 %) and invited experts' assessment (20 %)*

The course will be graded using letter grades (A+ - F)

4. Course schedule

Date	Week	**Seminar classes (Rm 5506)**	**Case Study Project (CYT-UG002)**
20 June	1	Science and pseudoscience; Evaluating evidences	Introduction of case study project requirements, Analysis of case study examples
22 June	1	Developing hypothesis and predictions	Identify case study topic for each student; Meet with instructor to discuss case study topic
24 June	1	Testability and plausibility; Biases	Meet with instructor to confirm case study topic
27 June	2	(no lecture)	Presentation of case study topic to the class; Reflect on comments from presentation of topics, modify research methods/goals if necessary
29 June	2	(no lecture)	Work on case study research
4 July	3	(no lecture)	Work on case study research
6 July	3	(no lecture)	Work on case study research
8 July	3	(no lecture)	Work on case study research
11July	4	(no lecture)	Work on case study research
13 July	4	(no lecture)	Work on case study research Work on scientific report Work on science communication
15 July	4	Last class – Presentation of findings	Work on case study research Work on scientific report Work on science communication
31 July (Sunday)			**Deadline: Submission of science communication (laymen audience)** Presentation to external experts /publish to public channels
31 July (Sunday)			**Deadline: Submission of scientific report (professional audience)**

The Hong Kong University of Science and Technology

CHEM 3610B Chemistry Internship

Course Outline

2022 Summer

1. **Instructor/Coordinator**:
   Name: Prof. CHAN, Ho-Wai Dennis (e-mail: chanhw@ust.hk)
   Office: Room 4528 (Lift 25 or 26) *Phone: 3469-2099*

2. **Meeting Time and Venue:**

	Internship work	**Presentation/sharing**
Date/Time:	*[to be arranged by partner]*	23rd August 2022 [time to be arranged.]
Venue:	*[to be arranged by partner]*	a classroom on HKUST campus *or ZOOM (if social distancing is necessary)*

3. **Course Description:**
   Credit points: 3 units
   Pre-requisite: CHEM3550 Synthetic Chemistry Laboratory; or
   CHEM3555 Molecular Characterization Chemistry Laboratory
   Brief information: This course provides students with the opportunity to gain working experience in chemistry field. Students will undertake training and supervised internships in our collaborating companies/organizations/units.

4. **Intended Learning Outcomes (ILOs):**
   Students are expected to achieve the following outcomes after taking the course:
   (i) Apply academic knowledge to real-life situation.
   (ii) Communicate with professionals.
   (iii) Work independently and collaborate in teamwork.
   (iv) Reflect on their learning progress, and develop a motivation in lifelong learning.

5. **Assessment scheme:**

Type of Assessment	**Weighting**	**Assessing ILOs**
1. Written Assignments: (i) initial report and (ii) final report	40%	(ii) & (iv)
2. Presentation (12 to 15 min, plus 5 min Q and A)	20%	(i) & (ii)
3. Performance (to be assessed by the internship supervisor)	40%	(i), (ii) & (iii)

6. **Student Learning Resources:**
   To be arranged by internship supervisor.

7. **Teaching and Learning Activities:**

Type of Activities	**ILOs**
1. Training provided by internship supervisor.	(i)
2. Guidance on writing reports at the initial and final stages of the internship. Students are required to regularly communicate orally with internship supervisor(s), the course coordinator and co-workers during internship.	(ii)
3. Duties assigned by internship supervisor(s) to be done either individually and in a team.	(iii)
4. Guidance on reflection on their learning progress.	(iv)

8. **Class Schedule:**
   On-site internship: (To be arranged by internship supervisor).
   Oral presentation/sharing: 23rd August 2022.

The Hong Kong University of Science and Technology
Department of Chemistry

CHEM 4680 Undergraduate Research
Course Outline

1. Course Description

Credit Points: 3
Pre-requisite: CHEM 2150 and CHEM 2250
Instructor(s): Research Faculties of Chemistry Department

Brief Information/synopsis:

Students conduct original research in accordance with their ability and background, and under the supervision of a research faculty. The final course grade is determined based on an oral presentation and a written report to be submitted to a judging committee, which includes the faculty supervisor plus at least one other faculty. Enrollment in the course requires approval of the faculty supervisor.

2. Intended Learning Outcomes

Upon successful completion of this course, students are expected to be able to:

1	Work independently, to handle and use appropriate instrumentation, interpret data, and complete given tasks in a research setting, and to prepare a written report.
2	Communicate more effectively in speaking and writting, both about their newly acquired knowledge and knowledge in general.
3	Recognize deficiencies in knowledge existing in chemistry, and to plan and mount a research study to address these deficiencies.
4	More critically assess data presented in textbooks, the primary literature or other sources, e.g. electronic data bases, patents.
5	In general, to appreciate the importance of research in relation to science, the definition of problems in research, and how the corpus of scientific knowledge is able to expand through the overall reserach effort for the betterment of humankind.

3. Course Requirements and Grading

At the end of the course, **students are required to give an oral presentation and submit a written report to document their project work**. Course grades will be determined by a faculty panel consisting of their research supervisor and at least one other faculty member. Students will be evaluated based on their research performance, oral presentation (including the Q&A session), and written report.

CHEM 4691 Capstone Research I

Course Outline (Summer 2021/22)

1. Course Description

Pre-requisite: CHEM 3550 and CHEM 3555

Exclusion: CHEM 4689

Instructor(s)/Project Supervisor(s): Research Faculties of Chemistry Department

Course Coordinator: Prof. Emily M.W. Tsang

Reference Librarians:

Mr. CHOI, Samson (lbsamson@ust.hk) (Tel: 2358 6763)

Mr. LI, Lewis (lblewis@ust.hk) (Tel: 2358-6769)

Brief Information/synopsis:

This is a project-based course that provides students an opportunity to integrate and apply their chemical knowledge learnt in regular lecture and lab courses. Students will carry out a research project under the supervision of a faculty member/teaching staff. At the end of the course, students are required to submit a written report and deliver an oral presentation to document their learning experiences. Students should seek instructor's approval prior to enrollment in the course.

2. Intended Learning Outcomes

Upon successful completion of this course, students are expected to be able to:

1	Demonstrate awareness of chemical topics relevant to social and daily life.
2	Analyze and interpret experimental data, critically assess data in literature and extract useful data from it.
3	Carry out directed research by selecting appropriate topics and procedures, and presenting the results.
4	Communicate effectively both orally and in writing with professionals and/or lay audience.
5	Demonstrate information technology skills, especially in the areas of information retrieval, literature searching and use of library database.
6	Show self-awareness, work independently and collaborate effectively with other people in a team.

3. Grading

Weight	Assessment	Course ILOs
50%	Lab Performance and Participation	1,2,3,4,5,6
30%	Written Research Thesis	1,2,3,4,5
20%	Oral Presentation	4,5,6

4. **<u>Mandatory</u> Library Trainings Schedule:**

The following library training sessions are ***mandatory***. Attendances will be taken and counted towards your course participation scores.

Date	Activity	Venue
22/6 (Wed, 10:30 – 11:20)	**SciFinder-n Workshop**	Zoom Meeting (Meeting Link on Canvas) (SciFinder vendor)
29/6 (Wed, 10:30 – 11:20)	**Library Workshop I: Literature Search Training**	Classroom B (Lib LG1)* (Mr. L. Li/Mr. S. Choi)
13/7 (Wed, 11:30 – 12:20)	**Chemical Structure Drawing Training**	Classroom B (Lib LG1)* (Prof. E. Tsang)
20/7 (Wed, 10:30 – 11:20)	**Library Workshop II - Referencing Training**	Classroom B (Lib LG1)* (Mr. L. Li/Mr. S. Choi)

*Subject to change, depending on the pandemic situation.